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09/880,631	06/12/2001	Wenting Tang	HP-10010812	5913

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EXAMINER	
TODD, GREGORY G	

ART UNIT	PAPER NUMBER
2157	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/880,631	TANG ET AL	
	Examiner	Art Unit	
	Gregory G Todd	2157	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 12 June 2001.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-37 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-37 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 08/09/01.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This is a first office action in response to application filed, with the above serial number, on 12 June 2001 in which claims 1-37 are presented for examination. Claims 1-37 are therefore pending in the application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 5 recites the limitation "step (e)" in line 14. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-37 are rejected under 35 U.S.C. 102(e) as being anticipated by Albert et al (hereinafter "Albert", 6,775,692).

Albert teaches the invention as claimed including TCP state migration and monitoring (at least Abstract).

As per Claim 1, Albert teaches in a communication network, a method of TCP state migration comprising the steps of:

a) establishing a TCP/IP communication session between a client computer and a first server computer (forwarding agent & service manager), said first server computer part of a plurality of server computers forming a web cluster containing information (at least col. 7, lines 36-60; col. 3, lines 22-57; forwarding agents connecting client / server clusters), said communication session established for the transfer of data contained within said information (at least col. 7, lines 36-60; col. 3, lines 22-57; forwarding agents connecting client / server clusters);

b) handing off said communication session to a selected server computer (a back-end server) from said first server computer over a persistent control channel using TCP handoff modules that are dynamically loadable within TCP/IP stacks in operating systems located at both said first server computer and said selected server computer, that implement a TCP handoff protocol that works within kernel levels of an existing TCP/IP protocol (at least col. 14 line 65 - col. 15 line 27; SYN/ACK packets); and

c) migrating a first TCP state of said first server computer to said selected server computer, and a second TCP state of said selected server computer to said first server computer over said control channel (at least Fig. 5; col. 14, lines 1-15; forwarding data packet).

As per Claim 2. The method as described in Claim 1, wherein said step a) comprises the steps of:

receiving a SYN packet from said client at a first BTCP module located at said first server computer (at least col. 12 line 23 - col. 13 line 51);

sending said SYN packet upstream to a first TCP module located above said first BTCP module in a first operating system of said first server computer (at least col. 12 line 23 - col. 13 line 51);

receiving a first SYN/ACK packet from said first TCP module (at least col. 12 line 23 - col. 13 line 51);

parsing said first initial TCP state from said first SYN/ACK packet, including a first initial sequence number for said first TCP module associated with said TCP/IP communication session (at least col. 12 line 23 - col. 13 line 51; col. 19, lines 12-15);

sending said SYN/ACK packet to said client (at least col. 12 line 23 - col. 13 line 51);

receiving an ACK packet from said client at said first BTCP module (at least col. 12 line 23 - col. 13 line 51);

sending said ACK packet to said first TCP module (at least col. 12 line 23 - col. 13 line 51);

receiving a web request packet associated with said TCP/IP communication session at said first BTCP module at said first server computer (at least col. 12 line 23 - col. 13 line 51);

storing said SYN, ACK and said web request packet at said first server computer (at least col. 12 line 23 - col. 13 line 51; col. 19, lines 12-15; TCP connection being established between the client, forwarding agent and server).

As per Claim 3. The method as described in Claim 2, wherein said step b) comprises the steps of:

examining content of said web request packet (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing);

determining which of said plurality of server computers, a selected server computer, can best process said WEB request packet, based on said content (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing);

sending a handoff request from said first BTCP module to a second BTCP module at said selected server computer over said control channel, if said selected server computer is not said first server computer (at least col. 14 line 65 - col. 15 line 27; SYN/ACK packets);

including said SYN packet and said ACK packet in said handoff request packet (at least col. 14 line 65 - col. 15 line 27; SYN/ACK packets);

changing a first destination IP address of said SYN packet to a second IP address of said selected server computer, at said second BTCP module (at least col. 7 line 60 - col. 8 line 11; modifying addresses in header);

sending said SYN packet to said second TCP module (at least col. 12 line 23 - col. 13 line 51);

receiving a second SYN/ACK packet at said second BTCP module (at least col. 12 line 23 - col. 13 line 51);

parsing said second initial TCP state from said second SYN/ACK packet, including a second initial sequence number, for said second TCP module, that is

associated with said TCP/IP communication session; changing a second destination IP address of said ACK packet to said second IP address, at said second BTCP module (at least col. 12 line 23 - col. 13 line 51);

updating said ACK packet to reflect said second TCP state of said selected server computer in said communication session; sending said ACK packet that is updated to said second TCP module; and sending a handoff acknowledgment message to said first BTCP module (at least col. 12 line 23 - col. 13 line 51).

As per Claim 4. The method as described in Claim 3, wherein step c) comprises the steps of:

monitoring traffic associated with establishing said TCP/IP communication session in step a), at said first BTCP module, to parse a first initial TCP state of said first server computer, said first initial TCP state associated with said TCP/IP communication session (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing and analyzing packets for desired content); and

migrating said first initial TCP state to said second BTCP module over said control channel by including said first initial TCP state in said handoff request packet, said first initial TCP state including a first sequence number, such that said second BTCP module can calculate said first TCP state for said first server computer in said TCP/IP communication session (at least Fig. 5; col. 14, lines 1-15; forwarding data packet).

As per Claim 5. The method as described in Claim 3, wherein step c) comprises the steps of:

monitoring traffic associated with handing off said TCP/IP communication session in step a), at said second BTCP module, to parse a second initial TCP state of said selected server computer, said second initial TCP state associated with said TCP/IP communication session (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing and analyzing packets for desired content); and

migrating said second initial TCP state of said selected server computer to said first BTCP module by including said second initial TCP state in said handoff acknowledgment packet, said second initial TCP state including a second initial sequence number, such that said first BTCP module can calculate said second TCP state for said selected server computer in said TCP/IP communication session (at least Fig. 5; col. 14, lines 1-15; forwarding data packet).

As per Claim 6. The method as described in Claim 2, comprising the further steps of:

intercepting a connection indication message sent from said first TCP module to an application layer above said first TCP module at a first upper-TCP (UTCP) module, said connection indication message sent by said first TCP module upon establishing said communication session (at least col. 15 line 36 - col. 16 line 15; col. 8, lines 17-25; http from client intercepted by service manager and forwarding agent); and

holding said connection indication message at said first UTCP module (at least col. 15 line 36 - col. 16 line 15; col. 8, lines 17-25).

As per Claim 7. The method as described in Claim 6, wherein said method comprises the further steps of:

sending a reset packet from said first BTCP module upon receiving said handoff acknowledgment packet to said first TCP module (at least Fig. 13; col. 12 line 23 - col. 13 line 51; col. 32, lines 46-63; TCP connection ending between the client, forwarding agent and server);

discarding said connection indication message at said first UTCP module (at least Fig. 13; col. 12 line 23 - col. 13 line 51; col. 32, lines 46-63; TCP connection ending between the client, forwarding agent and server);

receiving incoming data packets from said client at said first BTCP module (at least col. 15 line 36 - col. 16 line 15; col. 8, lines 17-25; http from client);

changing said destination addresses of said incoming data packets to said second IP address (at least col. 7 line 60 - col. 8 line 11; modifying addresses in header);

updating sequence numbers and TCP checksum in said data packets to reflect said second TCP state of said selected server computer (at least col. 12 line 23 - col. 13 line 51; col. 19, lines 12-15); and

forwarding said data packets to said selected server computer (at least Fig. 5; col. 14, lines 1-15; forwarding data packet).

As per Claim 8. The method as described in Claim 6, comprising the further steps of:

sending notification from said first BTCP module to said first UTCP module to release said connection indication message, if said selected server computer is said

first server computer (at least Fig. 13; col. 12 line 23 - col. 13 line 51; col. 32, lines 46-63; TCP connection ending between the client, forwarding agent and server);

sending incoming data packets, including said web request packet, from said client, received at said first BTCP module, upstream (at least Fig. 13; col. 12 line 23 - col. 13 line 51; col. 32, lines 46-63; TCP connection ending between the client, forwarding agent and server).

As per Claim 9. The method as described in Claim 1, comprising the further step of:

intercepting outgoing response packets from said selected server computer at a second bottom TCP (BTCP) module located at said selected server computer (at least col. 12 line 23 - col. 13 line 51);

changing source addresses of said response packets to a first IP address of said first server computer (at least col. 7 line 60 - col. 8 line 11; modifying addresses in header);

updating sequence numbers and TCP checksum in said response packets to reflect said first TCP state of said first server computer (at least col. 12 line 23 - col. 13 line 51; col. 19, lines 12-15); and

sending said response packets to said client (at least col. 7 line 60 - col. 8 line 11; modifying addresses in header).

As per Claim 10. The method as described in Claim 1, comprising the further steps of:

monitoring TCP/IP control traffic for said communication session at said second BTCP module (at least col. 32, lines 46-63; col. 8, lines 17-39; service manager monitoring packets);

understanding when said communication session is closed at said second server computer (at least col. 32, lines 46-63; col. 8, lines 17-39; connection ends);

sending a termination message to said first server computer over said control channel (at least col. 32, lines 46-63; connection ends);

terminating said TCP/IP communication session at said first server computer by terminating a forwarding mode at said first BTCP module (at least col. 32, lines 46-63; connection ends); and

freeing data resources associated with said communication session at said first server computer (at least col. 3, lines 26-56; load balancing).

As per Claim 11, Albert teaches in a communication network, a method of TCP state migration comprising the steps of:

a) establishing a TCP/IP communication session between a client computer and a first server computer, said first server computer part of a plurality of server computers forming a web cluster containing information, said communication session established for the transfer of data contained within said information (at least col. 7, lines 36-60; forwarding agents connecting client/servers);

b) monitoring traffic associated with establishing said TCP/IP communication session to understand a first initial TCP state of said first server computer associated

with said TCP/IP communication session, at a first bottom TCP (BTCP) module at said first server computer (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing and analyzing packets for desired content);

c) receiving a web request associated with said TCP/IP communication session at said first BTCP module at said first server computer (at least col. 12 line 23 - col. 13 line 51);

d) examining content of said web request (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing);

e) determining which of said plurality of server computers, a selected server computer, can best process said web request, based on said convent (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing);

f) handing off said communication session to said selected server computer from said first server computer over a persistent control channel, if said selected server computer is not said first server computer (at least col. 14 line 65 - col. 15 line 27; SYN/ACK packets);

g) monitoring traffic associated with handing off said TCP/IP communication session to understand a second initial TCP state of said selected server computer associated with said TCP/IP communication session, at a second BTCP module at said selected server computer (at least col. 9, lines 10-34, 45-58; service manager detailing load balancing and analyzing packets for desired content);

h) migrating said first initial TCP state to said selected server computer over said control channel, such that said second BTCP module can calculate a first TCP state for

said first server computer in said TCP/IP communication session (at least Fig. 5; col. 14, lines 1-15; forwarding data packet);

i) sending a second initial TCP state of said selected server computer to said first BTCP module, such that said first BTCP module can calculate a second TCP state for said selected server computer in said TCP/IP communication session (at least Fig. 5; col. 14, lines 1-15; forwarding data packet);

j) forwarding data packets received at said first BTCP module from said client to said selected server computer, by changing said data packets to reflect said second TCP state and a second IP address of said selected server computer (at least Fig. 5; col. 14, lines 1-15; forwarding data packet);

k) sending response packets from said selected server computer directly to said client computer by changing said response packets to reflect said first TCP state and a first IP address of said first server computer (at least col. 7 line 60 - col. 8 line 11; modifying addresses in header); and

l) terminating said TCP/IP communication session at said first server computer when said TCP/IP communication session is closed (at least col. 32, lines 46-63; connection ends).

As per Claim 14. The method as described in Claim 13, wherein said ACK packet includes said first initial TCP state of said first server computer as provided for in step f) (at least Fig. 5; col. 7 line 60 - col. 8 line 11; modifying addresses in header).

As per Claim 21. The method as described in Claim 11, wherein each of said plurality of server computers is constructed similarly including BTCP modules located downstream from TCP modules, and UTCP modules located upstream from TCP modules (at least Fig. 2; col. 7 line 36 - col. 8 line 25).

As per Claim 22. The method as described in Claim 12, comprising the further step of storing said web request, said SYN packet, said ACK packet, and said web request at said first server computer (at least Fig. 5).

As per Claim 23. The method as described in Claim 22, wherein said control channel allows for communication between all UTCP modules (at least Fig. 2).

As per Claim 24. The method as described in Claim 11, wherein said plurality of server computers is coupled together over a wide area network in said communication network (at least Fig. 2; col. 7, lines 37-60).

As per Claim 25. The method as described in Claim 11, wherein said information is partitioned/partially replicated throughout each of said plurality of server computers (at least col. 3, lines 22-57; clustered servers).

Claims 12-13, 15-20 do not add or define any additional limitations over claims 1-10 and therefore are rejected for similar reasons.

Claims 26-37 do not add or define any additional limitations over claims 1-10 and therefore are rejected for similar reasons.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Brendel et al, Brendel, Vange et al, Soderberg et al, Aviani et al,

and Colby et al are cited for disclosing pertinent information related to the claimed invention. Applicants are requested to consider the prior art reference for relevant teachings when responding to this office action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory G Todd whose telephone number is (703)305-5343. The examiner can normally be reached on Monday - Friday 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ario Etienne can be reached on (703)308-7562. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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PRIMARY EXAMINER